

# Environmental Team

## Status of the National Ambient Air Quality Standards for PM<sub>2.5</sub>: An Industry Perspective

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# Environmental Team

Implementation  
of Revised Air  
Quality  
Standards for  
Ozone and  
Particulate  
Matter, 62 Fed.  
Reg. 36421  
(1997).

- “[T]here remain scientific uncertainties associated with the health and environmental effects of PM and the means of reducing them.”
- Based on a new review of the NAAQS, EPA will determine “whether to revise or maintain the standards” before attainment status is determined.

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Implementation  
of Revised Air  
Quality  
Standards for  
Ozone and  
Particulate  
Matter, 62 Fed.  
Reg. 36421  
(1997).

- The “first priority” is establishment of a comprehensive monitoring network to determine ambient fine particle concentrations.
- All monitors will provide for “limited” chemical speciation of the PM, with at least 50 providing for “a more comprehensive speciation.”

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What is the status of the ambient PM<sub>2.5</sub> monitoring network and what does this mean for attainment/nonattainment?

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## Development of the PM<sub>2.5</sub> Monitoring Network

- According to EPA, as of 3/1/00, 1,022 of 1,050 planned PM<sub>2.5</sub> monitors were operating.
- By the third quarter of 2001, 1,148 PM<sub>2.5</sub> monitors had been deployed.

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## Attainment Status Decisions

- 3 complete consecutive calendar years of Federal Reference Monitor (FRM) data are required to determine attainment status.
- Completeness requires -
  - 75% of scheduled monitoring days each quarter have valid data *or*
  - 11 valid data points each quarter if levels are high

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## Ambient Monitoring Data -2000

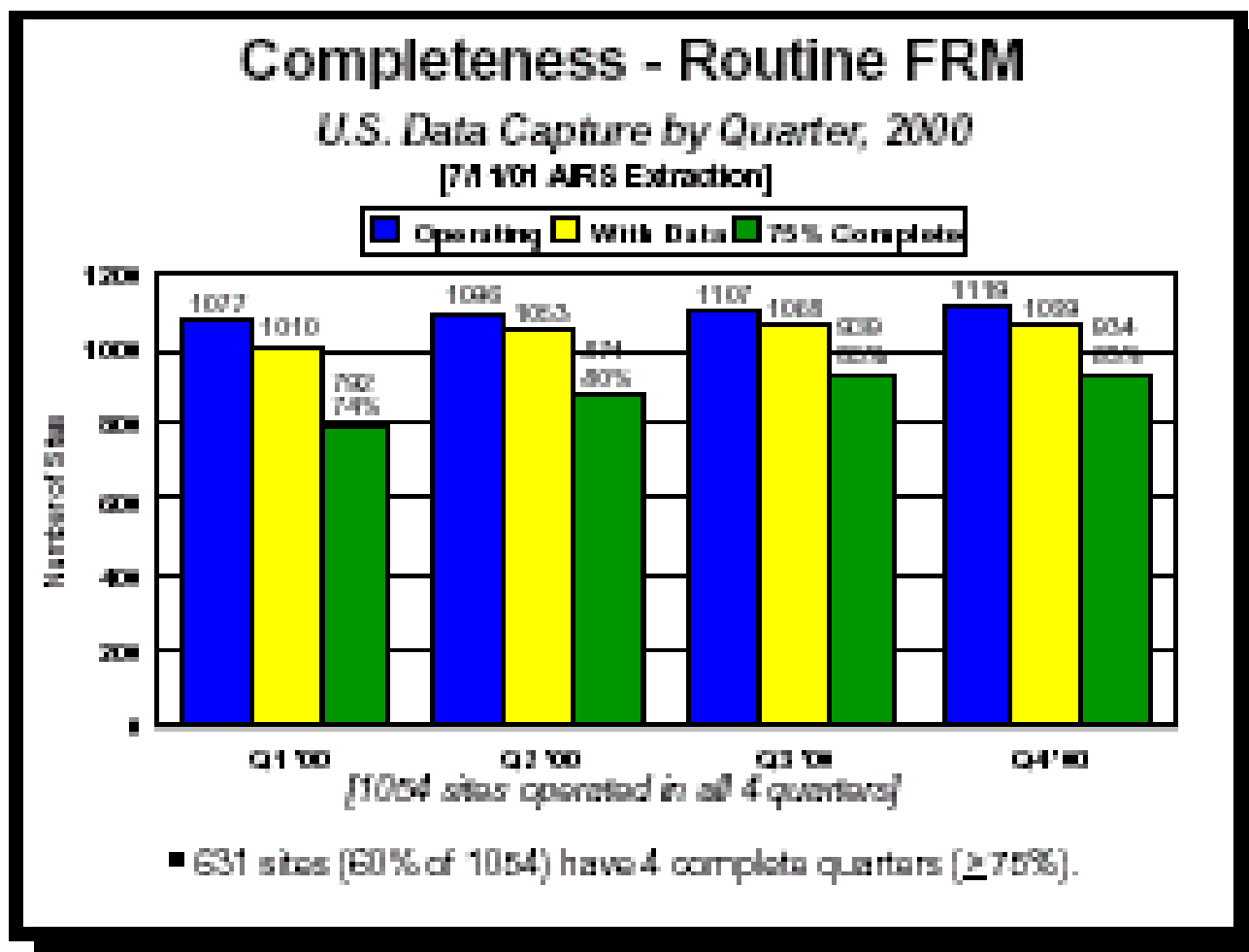
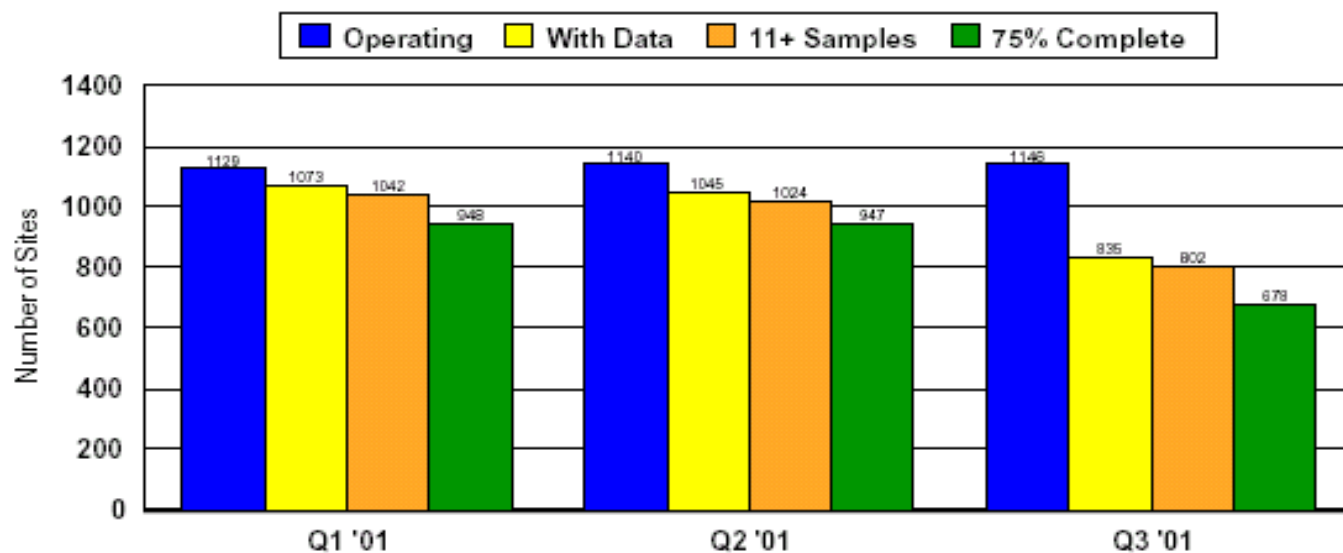


Figure 2.1 Routine  $PM_{2.5}$  mass data completeness (all sites)

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## Ambient Monitoring Data -2001

### Completeness - PM<sub>2.5</sub> FRM Concentrations U.S. Data Capture by Quarter, 2001



[1,112 sites operated in all 3 quarters.]

- 578 sites (52% of 1,112) have 3 complete quarters ( $\geq 75\%$ ).
- 759 sites (68% of 1,112) have 11+ samples in all 3 quarters

[Based on AIRS data entered through 12/20/01 for All Types of PM<sub>2.5</sub> Monitors]



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What about speciated ambient monitoring data?

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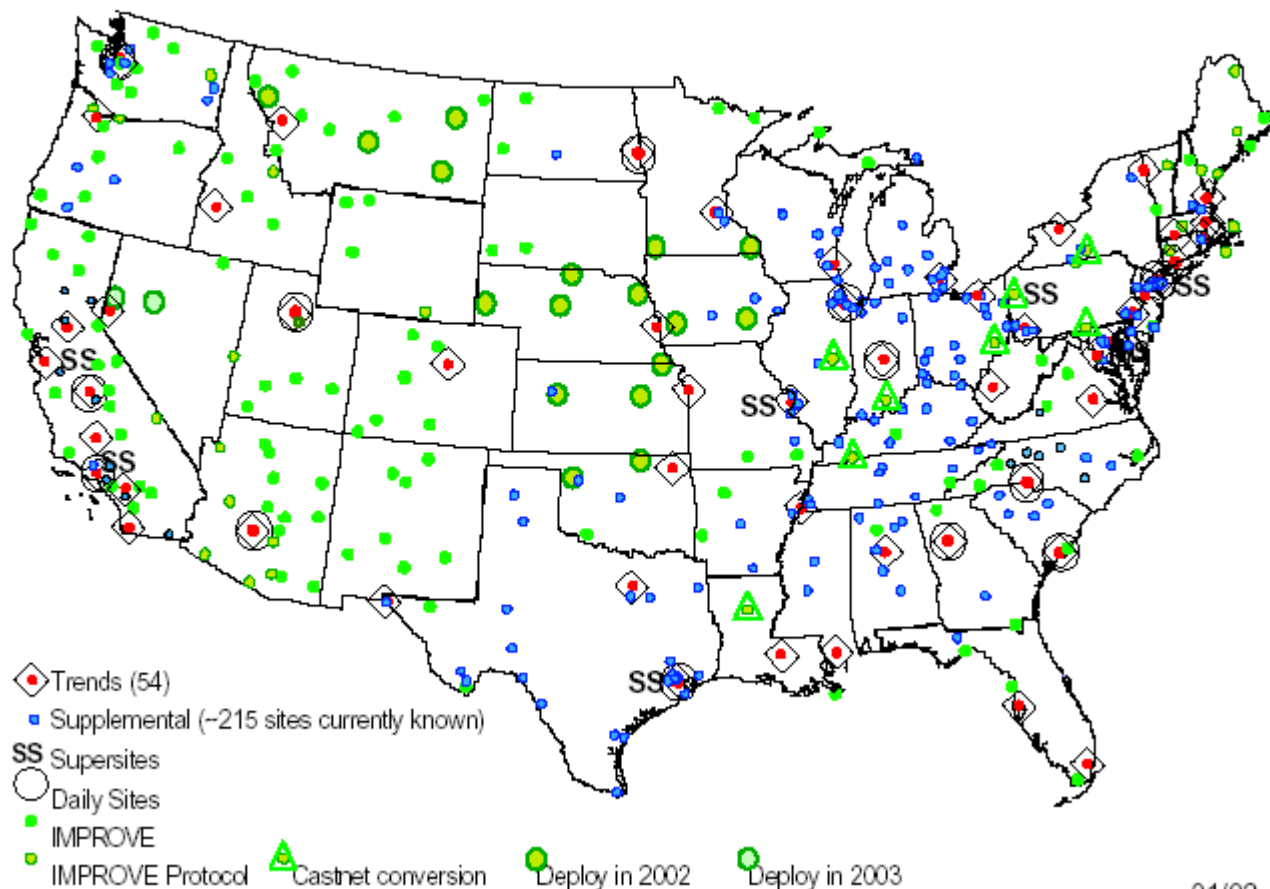
## Speciation Monitoring Network

- As of 3/1/00, only 13 of approximately 300 planned chemical speciation sites were operating.
- By 6/01, "over 30" speciation sites were operating.
  - Deployment of "approximately 200 planned supplemental [chemical] speciation network sites" was anticipated by the end of 2001.
  - Deployment of some rural sites is not planned until 2003.

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## Speciation Monitoring Network

### Current/Planned Urban & Rural PM<sub>2.5</sub> Speciation Networks



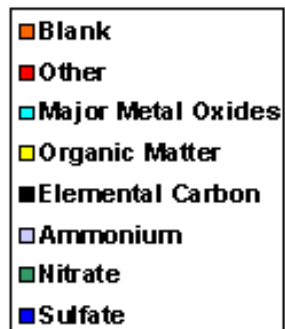
## Why Collect Speciated Data?

### Per EPA:

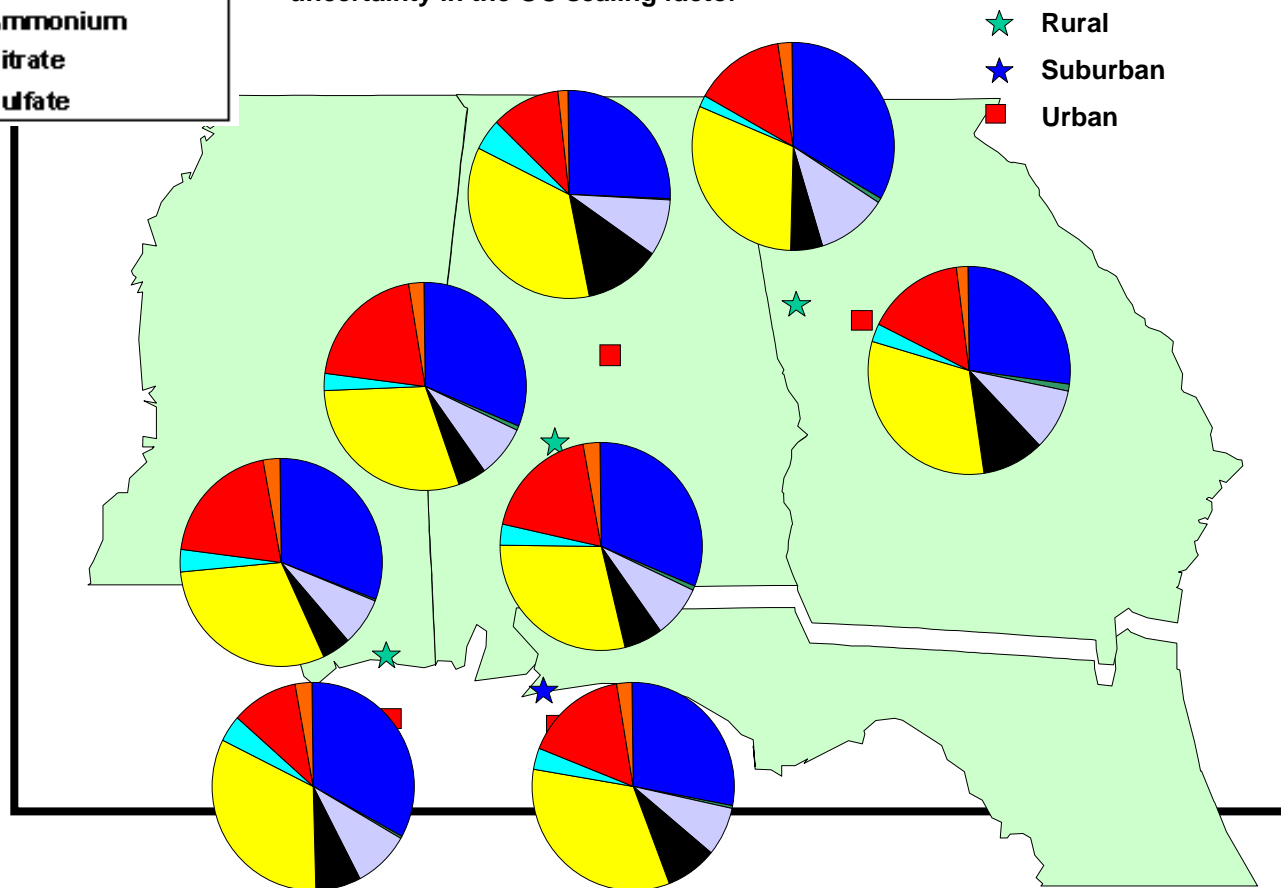
- Speciated  $PM_{2.5}$  data is needed to help choose and prioritize potential control strategies.
- The relative importance of each  $PM_{2.5}$  component in each area will determine the effectiveness of control strategies.
- PM models need speciated  $PM_{2.5}$  data.

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Speciated  
PM<sub>2.5</sub> Data  
from  
SEARCH --  
10/98-9/01



"Other" is defined as the difference between measured components and measured mass. "Other" can be positive or negative and consists of particle bound water and other un-measured components, net measurement uncertainties and uncertainty in the OC scaling factor

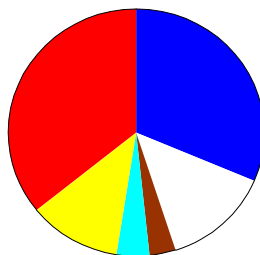


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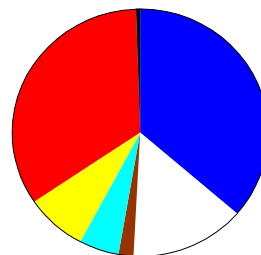
Speciated  
PM<sub>2.5</sub> Data  
from  
MARCH-  
MW

## Percentages of Total Mass (Summer/Fall 1999):

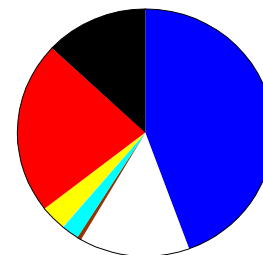
Chicago:



Cincinnati:



Athens, OH (rural):



■ Sulfate  
Ammonium

■ Nitrate

■ Crustal

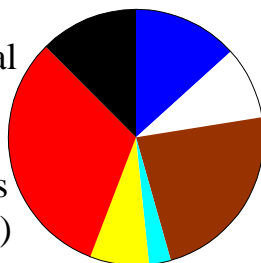
■ Elemental  
Carbon

■ Organics  
(OC\*1.4)

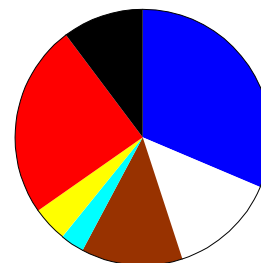
■ Other

## Percentages of Total Mass (Winter 2000):

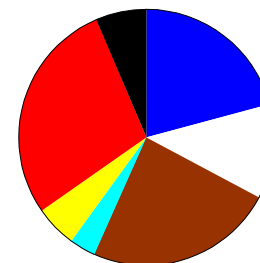
Chicago:



Cincinnati:



Athens, OH (rural):



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What were the scientific uncertainties and have they been resolved?

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National  
Research  
Council:  
Research  
Priorities for  
Airborne  
Particulate  
Matter

- Outdoor measures vs. actual human exposures
- Exposures of susceptible subpopulations to toxic PM components
- Air quality model development & testing
- Characterization of emission sources



# Environmental Team

National  
Research  
Council:  
Research  
Priorities for  
Airborne  
Particulate  
Matter

- Assessment of hazardous PM components
- PM deposition patterns & fate
- Effects of PM & co-pollutants
- Susceptible subpopulations
- Mechanisms of injury
- Methodological issues related to health risk assessment

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Research  
Status – Per  
NRC (2001)

- Initial phases of the research program “have shown promise.”
- “[A] number of critical specific subjects . . . should be given greater attention.”

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OMB:  
Research  
Needs

- “[P]otential confounding of PM health effects with other pollutants in the air”
- “[A]ttribution of the PM health effects to specific constituents”
- “[T]he quantitative relationship between exposure to different particles and various health effects”

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What about the standards review that is to be completed before attainment/nonattainment determinations are made?

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## NAAQS Review

- Two key documents are being prepared to provide a basis for the determination to “maintain or revise” the NAAQS
  - The Criteria Document will summarize the most recent science on health and welfare effects.
  - The Staff Paper will discuss policy options in light of that science.

## Criteria Document

- Preliminary draft 10/1999, with comments due & review by science advisors (CASAC) in 12/1999
- Second draft 3/2001, with comments due & CASAC review in 7/2001
- Third draft expected 4/2002, with comments due & CASAC review expected in 7/2002

## Staff Paper

- Preliminary draft 6/2001, with comments & CASAC review in 7/2001
- Second draft expected summer 2002, with comments & CASAC review in 9/2002

Key Issue:  
Inconsistent  
Study  
Results

EPA's Draft Criteria Document:  
Mortality Effects Estimates Associated With 24-  
Hour Concentrations of Fine Particle Indicators

Total Cardiovascular:

Santa Clara County, CA <sup>C</sup>	PM <sub>2.5</sub>	1.07 (p > 0.05)	13 (2, 105)
Buffalo, NY) <sup>D</sup>	SO <sub>4</sub>	1.040 (0.995, 1.088)	61.7 (0.78, 390.5) nmol/m <sup>3</sup>
Philadelphia, PA <sup>F</sup> (seven-county area)	PM <sub>2.5</sub>	1.028 (p < 0.055)	17.28 (-0.6, 72.6)
Detroit, MI <sup>G</sup>	PM <sub>2.5</sub>	1.032 (0.977, 1.089)	18 (6, 86)
Phoenix, AZ <sup>H</sup>	PM <sub>2.5</sub>	1.187 (1.057, 1.332)	13.0 (0, 42)
Los Angeles, CA <sup>I</sup>	PM <sub>2.5</sub>	1.266 (1.003, 1.048)	22 (4, 86)
San Bernadino and Riverside Counties, CA <sup>J</sup>	Est. PM <sub>2.5</sub>	1.007 (0.997, 1.017)	32.5 (9.3, 190.1)
Coachella Valley, CA <sup>K</sup>	PM <sub>2.5</sub>	1.086 (0.937, 1.258)	16.8 (5, 48)



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Key Issue:  
Toxicity of  
Particle  
Types

Per OMB:

- EPA has adopted a “default position” that all particles are equally toxic.
- “There is emerging evidence that some types of fine particles may pose a greater health risk.”
- Identification of those particles most responsible for health risks will permit controls that do more for public health at less cost.

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Per National Research Council:

Key Issue:  
Toxicity of  
Particle  
Types

"Evidence on the particle characteristics that determine risk could have a profound influence on decisionmaking."

BUT –

Several "potentially important PM characteristics" have not received adequate attention.

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## Key Issue: Role of Co- Pollutants

Per the National Research Council:

- “[T]he research effort in evaluating the role of gases in influencing particle effects seems to be lagging behind the effort in studying specific components of PM in the absence of gaseous co-pollutants.”
  - More true of controlled human exposures than epidemiology

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Key Issue:  
Role of Co-  
Pollutants

Per EPA's draft Criteria Document:

"[T]here is not yet sufficient evidence by which to confidently separate out fully the relative contributions of PM versus those of other gaseous pollutants . . . ."

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## Other Key Issues

- The dose-response relationship
- The possible existence of a response threshold
- Ambient measurements versus personal exposure to fine PM and fine PM constituents

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## Conclusion

What's needed?

- Adequate monitoring to characterize air quality
- Objective review of the new science
- Acknowledgment of remaining uncertainties
- Risk analyses that treat uncertainties comprehensively



Thank you.